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VI. — *Reise um die Erde, durch Nord-Asien und die beiden Oceane, in den Jahren 1828, 1829, und 1830.* Von Adolph Erman. Berlin, 1833 & 1835. (*Travels round the World, through Northern Asia and both Oceans, in the Years 1828, 29, and 30.* By Adolph Erman. Berlin. First Part, in 2 vols. 8vo.)

SUCH is the title of a work lately published at Berlin, giving an account of a journey round the world, chiefly devoted to magnetic and meteorological observations, made partly in company with the well-known Professor Hansteen of Christiania: and during which Mr. Erman has had the opportunity of observing terrestrial magnetism with the same instruments, and by like methods, from Berlin to the mouth of the Obi; thence to the sea of Okhotsk; and from Kamtschatka, round Cape Horn, to Europe.

In a brief analysis we desire to point attention to a very valuable work; reserving for some future occasion longer extracts from the account of some almost unknown countries.

Quitting St. Petersburg, Mr. Erman went to Moskow, Kasan, and Perm, crossed the Ural Mountains to Tobolsk, and along the Obi to Obdorsk, situate near the arctic circle, at a small distance from the river. Having returned to Tobolsk he proceeded to Irkutsk, and visited from that place Kiakhta and the country south of the Baikal Lake. Then he went from Irkutsk to Yakuzk, and crossing the Aldan Mountains to Okhotsk. From the last named place he passed to Kamtschatka, and thence to New Archangesk, in the island of Sitkha, and returned to Europe by way of Cape Horn; touching in this passage only at San Francisco in California, at the island of Otaheite and Rio Janeiro. The two published volumes contain only his journey to Tobolsk, and hence to Obdorsk, with his astronomical and magnetic observations.

The object which Professor Hansteen and our traveller had in view obliged them to make exact observations on the geographical position of places, and their elevation above the level of the sea; and in this respect they have considerably enlarged our knowledge of these countries. As far as Tobolsk the geographical position of the places was found sufficiently exact, as they are laid down in the maps of the Russian governments, published in 1826 by Piazishef. But they are much less so along the banks of the Obi, where to the position of the maps the following corrections are to be made:—

Deujikowo	.	in lat.	—0° 2'	in long.	—0° 17'
Yelisárowo	.	.	—0 4	.	—0 16
Shorkal	.	.	+0 25	.	—2 25
Beresow	.	.	0 0	.	—2 13
Obdorsk	.	.	—0 7	.	—3 27

Professor Hansteen, who alone descended the River Yenesei to

the Icy Sea, found likewise that the places towards the mouth of the river were laid down about three degrees too far east. But Mr. Erman has not given the detail of his observations.

Between Yakuzk and Okhotzk he again found considerable differences between his observations and the maps. The following corrections are necessary:—

Yakuzk . . .	in lat.	+0° 1'	in long.	+0° 5'
Porotowsk . . .		+0 12		—0 14
Lebeghine . . .		+0 51		+0 2
Nokhinsk . . .		+0 49		—0 38
Aldanskū } . . .		+0 51		—0 34
Perewos }				
Tshernolyes . . .		+0 28		—1 27
Okhozsk . . .		+0 1		—0 18

Still greater are the differences between his observations and the maps in the peninsula of Kamtshatka.

The mouth of Tigil River in lat.	—0° 11'	in long.	+1° 51'
The village Tigisk . . .	—0 3		+1 40
Yelowka . . .	—0 8		—0 48
Kliutshewk . . .	—0 12		—1 48
Petropauls harbour . . .	—0 1		—0 18

By these observations of Mr. Erman the form of the peninsula of Kamtshatka must greatly be changed on our maps.

Mr. Erman further observes, that the places lying on the road between Petersburg and Yakuzk are laid down with some degree of accuracy, there occurring rarely errors of thirty minutes of longitude.

Not less important are his observations on the elevation of a great number of places through which he passed in Russia and Siberia; they are the more valuable as our author has taken great pains to compare his barometrical observations with others which have been made at Danzig and Mitau for a long series of years.

In passing from Petersburg to Moskwa he found Pomoranya 32 feet above the sea, and Nowgorod Welikii 64 feet. Then he crossed the high ground which divides the waters running in opposite direction to the Baltic and Caspian seas, and found the town of Waldai 867 feet, and Chatilowo 745 feet above the level of the sea. At Wuidropusk the ground had lowered to 597 feet, but it rose again; Torjok, on the river Twerza, having an elevation of 661 feet. The town of Moskwa he found not more than 415 feet above the sea.

Mr. Erman took great pains to ascertain the elevation of the town of Kasan and that of the mouth of the River Kasanka, and in this task he was much aided by different series of barometrical observations, which had been made at the University of Kasan.

The elevation of the town he found to be 104.8 feet, and that of the mouth of the Kasanka only 28.9 feet above the sea. This determination is of great importance, as it has some reference to the depression of the Caspian Sea below the level of the ocean. We translate the passage literally.

“ It is hardly necessary to mention that in this manner is also obtained, by means of the result just spoken of, the solution of a noted question,—viz., the level of the Caspian Sea ; for in measuring the course of the river Twerza and of the Upper Wolga, we find from Torjok to the mouth of the Kasanka about 155 German miles,\* whilst the Wolga, from this last point to the Caspian below Astrakhan, traverses a space of 205 German miles. Now our observations give us for the first 155 miles an inclination of 98.5 toises, or 630 feet English ; and for the other 205 miles a descent of 4.5† toises +  $x$ , if by  $x$  we designate the difference of level of the Caspian below the ocean ; supposing that at an equal elevation the pressure of the air is the same on the Baltic as at Kasan.

“ It hence results that, however great we suppose the gradual diminution of the inclination from the Twerza to the mouth of the Wolga, we shall have with little doubt a positive value for  $x$ . If, for example, we were to suppose the inclination from Torjok to Astrakhan diminishes uniformly, and that at Astrakhan it is equal to zero, we shall find that the difference of level of the Caspian below the ocean is 42.8 toises, or 274 feet English ; and at the same time the inclination of the Twerza at Torjok gives 0.810 of a toise, and that of the Wolga at Kasan 0.416 of a toise, for each German mile.”—Vide p. 359.

From Kasan Mr. Erman travelled to Perm in a north-eastern direction. After passing the river Wiatka at Malmuish (135 feet), he entered a much more elevated country between the rivers Wiatka and Kama, Milet being 321, Arporetch 514, Mukikaksi 539, Kojil and Uri 886, and Suri 912 English feet above the sea. The high hills, over which the road leads, between Suri and Debjosui, rise to 1085 feet, and the latter place is still 957 feet above the sea-level. Here Mr. Erman came nearest the line of separation between the waters running into the Caspian and White Sea, and it may therefore be supposed that the high land separating the upper branches of the Kama and Wuitshegda rises at least to 1500 feet. From Debjosui he descended gradually into the vale of the Kama to Perm, which is elevated 372 feet.

From Perm he went to Yekatarinburg, across the Uralian Mountains. Kungur on the Suilva is only 488 feet high, and may be considered as placed at the base of the Ural, for at a short distance

\* One German mile is equal to four and a half English miles nearly.

† There is manifestly some difficulty here ; 55.7 toises would seem to be the descent : it may be a misprint, or we may have mistaken the passage. It will be found at p. 359.—Ed.

from it is Morgunowo, at 937 feet high. Though the ground farther east is extremely uneven it does not suddenly rise, the village Bisersk having an elevation only of 931 feet. Between this village and that of Klenowsk occurs the first ridge of the Uralian Mountains, the heights rising to 1541 feet. The village of Klenowsk, between the first and second ridge, is at 1008 feet. The second ridge, which is the widest, rises to 1701 feet in the mountain-pass, between the villages Bilimbaievsk and Reshótin. At the base of this ridge is built the town of Yekatarinburg, 976 feet above the sea.

Travelling along the base of the eastern declivity of the Uralian Mountains, on a road which did not rise above 1200 feet, nor sink lower than 900 feet, Mr. Erman measured Mount Blagodát, consisting entirely of magnetic iron-ore, and lying near the village of Kuschiva,  $58^{\circ} 17' N.$  lat. He found its summit 1534 feet above the sea. Farther to the north, and nearly in the parallel of Werkhoturie, is Mount Katshkanar, which rises to 2960 feet. To about the same height rises Mount Kanjakowo, nearly  $60^{\circ} N.$  lat., and the two high summits of the Uralian Mountains near  $55^{\circ} N.$  lat. called Mount Kossolur and Taganai, do not appear to exceed it. The highest portion of the range seems to be beyond the polar circle, between  $66^{\circ} 49'$  and  $67^{\circ} 13'$ , where Mr. Erman determined the elevation of five mountains, the most northern and highest rising to 4908 feet, the second to 3993, the third to 2407, the fourth to 2240, and the fifth only to 1290 feet. These mountains lie north of Obdorsk, and are, therefore, called by him the Obdorskian Mountains.

The lower portion of the town of Tobolsk was found to be only 128, and the upper 357 feet above the level of the Icy Sea.

From Irkuzk, which is 1246 feet above the sea, Mr. Erman went to Kiachta, but the elevation of the latter town he did not determine by his own observations. He used for that purpose those made by the Academicians in the time of Catherine II., viz., 2228 feet above the sea.

Very numerous are the observations made by Mr. Erman on the road between Irkuzk and Yakuzk, and others were made a few days afterwards by Lieut. Due, the companion of Professor Hansteen. Our author compared them with great care, especially those made on the tract of land which contains the sources of the Lena river, because this country has always attracted the attention of the geographers, on account of the peculiarities of its surface. Though the country between Irkuzk and Tiúmenowsk on the Lena is extremely uneven, it is not mountainous, but a considerable rising is perceptible from the town of Irkuzk to the village of Kátshuga, where the rivulets have their sources which form the upper branch of the Lena. The lowest point he found at the

village of Khumutowsk, at some distance from Irkuzk, which was only 1117 feet high, but a hill near it rose to 1461 feet. At the village of Olsonsk the ground had risen to 1692 feet, and at Baghendaïsk even to 1771 feet. This was the highest point of the road. Khogotsk was 1618, Mansursk 1611, and Kátshuga only 1509 feet high. As Mr. Erman proceeded down the river Lena on the ice, the observations which he made may be considered as indicating the fall of that great river. At Botowsk he found the surface of its ice still 1044 feet, at Parshink 621 feet, at Nelinsk 432 feet, at Olehma 411 feet, and at Yakuzk only 287 feet above the level of the Icy Sea. For it is here to be observed that Mr. Erman came to these conclusions by comparing his observations and those of Lieut. Due with the mean elevation of the barometer at Ustyansk, on the shores of the Icy Sea at the mouth of the Yana river, which was found by Capt. Wrangel  $337''$  78 of the French foot.

From Yakuzk to Okhozk Mr. Erman passed the range of the Aldan mountains. He encountered here a difficulty in making his observations; for there exists a difference in the pressure of the air column at equal levels on the banks of the Lena, and on the shores of the sea of Okhozk. In reducing the barometrical observations at both places to the level of the sea, he found the elevation of the column of mercury at Yakuzk  $337''$  91, and at Okhozk  $331''$  31. He says that this strange difference has already been observed by other natural philosophers, and that it exists also in Kamtshatka. In order therefore to give his barometrical observations the greatest possible exactness, in order to measure the elevation of the ground, he has supposed that the pressure of the air continually decreases in proceeding from Yakuzk to Okhozk, though he thinks it probable that the highest part of the Aldan mountains may form a kind of boundary line.

The country lying along the road leading from Yakuzk to Okhozk may be divided into two portions; that which lies to the west of the Aldan river, a tributary of the Lena, rises continually, but gradually, as it proceeds to the east. At Tshasinghisk, several miles east of Yakuzk it attains only 347 feet; at Montjega, somewhat more than half-way between the Lena and Aldan, 642 feet; and at Nokhinsk, on the heights forming the western banks of the Aldan river, 751 feet. The depressions between these hills are flat, and descend rarely a hundred feet under the mean level. Aldanskü Perewos, in the valley of the river Aldan, is 424 feet above the sea.

On the eastern banks of the Aldan river, the mountain-range, which has derived its name from the stream, rises with a steep ascent. Bielskü Perewos, situate on a small tributary of the Aldan, lies 764 feet high; and east of it are two mountains, the

western rising to 970 feet, and the eastern to 1502 feet. Garnastakh, a solitary abode of a Tunguse family, lies in the middle of the range, 1531 feet above the level of the sea, on a rivulet. It is everywhere inclosed with high and steep mountains, of which that to the south, called by the natives Ulagtshan, is the highest. Its summit attains 2722 feet above the level of the sea. Dense forests ascend on its sides to 2252 feet, but single larch trees as far as 2504 feet. Between Garnastakh and Allukhiuna, which lies in a longitudinal valley on the bank of a river bearing the same name, is situated that part of the Aldan mountains which is called Sem Khrebt, or the Seven Backs, and which rises above the boundary of the larch-trees (*Pinus larix*). Its mean elevation is between 2400 and 2600 feet. But the mountains between Allukhiuna and the sea-coast are still higher. The mountain-pass, about six miles west from Khoimia is 2619 feet high; Khoimia itself, 2247; and Mount Kapitan, the highest point of the Aldan mountains in this part, rises to 4055 feet. On the east of Mount Kapitan the country continues to be from 2400 to 2600 above the level of the sea, and only to the east of Ketanda, in  $60^{\circ} 40' \text{ N. lat.}$  and  $141^{\circ} 38' \text{ E. long.}$  of Greenwich, it descends with a rather steep declivity. Okhozsk is only thirteen feet above the sea.

Mr. Erman made a great number of barometrical observations on the mountains in the interior of the peninsula of Kamtschatka: and that he might be enabled to determine the elevation of the mountains exactly, he caused corresponding sets of observations to be made at Tigilsk, near the mouth of the Tigil river, on the western coast of the peninsula; and at Peter Paul's Harbour, on its eastern shores. Here, too, he observed the difference in the pressure of the air at the same level. The mean elevation of the barometer at Tigilsk (in lat.  $58^{\circ}$ ) was 331<sup>'''</sup>99, and at Peter Paul's Harbour (in lat.  $53^{\circ}$ ) 334<sup>'''</sup>06; so that at a distance of five degrees of lat. there existed an apparent difference in the level of the sea, amounting to 24.83 toises, or 159 feet.

The travels of Mr. Erman in Kamtschatka were limited to the country between the mouth of the Tighil river (in lat.  $58^{\circ} 1\frac{1}{2}'$ ), and Peter Paul's Harbour (in lat.  $53^{\circ} 0' \text{ N.}$ ), and especially directed to the examination of the volcanoes, which occupy in this part the interior of the peninsula. He visited first the volcano of Shivelutsh, which rises with two peaks; the north-western (in lat.  $56^{\circ} 40' \text{ N.}$  and in long.  $160^{\circ} 12' 52''$ ) attains an elevation of 8716 feet; and the south-eastern (in lat.  $56^{\circ} 40' 32''$ , and in long.  $160^{\circ} 15'' \text{ E.}$ ) 10,591 feet above the sea. Trees were found to ascend its sides to 2837 feet. He then examined the great volcano of Kliutshewsk, whose summit he found to attain 15,825 feet above the level of the sea. A current of lava of recent date de-

scended on its sides to 8558 feet above the sea ; the *salix arctica* was frequent at 5322 feet, and mountain-asp was found as high as 3094 feet. He determines the geographical position of the summit to be in lat.  $56^{\circ} 4'$ , and long.  $160^{\circ} 52'$  E. The third volcano visited by Mr. Erman was Tolbátshinsk, which rises only to 8346 feet.

The personal narrative of this journey is filled with geographical detail on the country between Berlin and St. Petersburg, and thence to Tobolsk, as also from Tobolsk to the mouth of the river Obi. Though these details are sometimes very minute, they are far from being divested of interest. We omit them, and, more reluctantly, his observations on the water-communication existing in the interior of Russia—on the mines of the Uralian mountains, and the hydrography of the river Wolga and its affluents. Still more we regret that we have not space or leisure to insert a translation of the accounts he obtained at Tobolsk, respecting the country which is known under the name of the Steppe of the Khirghis, and through which, as it appears, there exists a regular commercial intercourse between Tobolsk and the town of Tashkend in the khanat of Khokan. As this country is nearly unknown to geographers, we desire to direct attention to the valuable information contained in these volumes.

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